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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

AHMED, SHAMIM

ART UNIT PAPER NUMBER

1765

DATE MAILED: 02/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/960,316

Applicant(s)

SHIBATA, TSUYOSHI

Examiner

Shamim Ahmed

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-4,6,9,10,12-14,16,19 and 21-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-4,6,9,10,12-14,16,19 and 21-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/25/03 has been entered.

Response to Arguments

2. Applicant's arguments with respect to claims 2-4,6,9,10,12-14,16,19,21-23 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2-4,6,9,21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoko (JP-7-135140) in view Forester et al (5,952,243).

As to claims 2-4, 21 and 23, Yoko disclose a process of making resist pattern, wherein a lower resist film (2) is formed over a semiconductor substrate (1) and an upper resist layer (4) is formed on the lower resist film and patterning the upper resist

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film to form an upper resist pattern (see the abstract, paragraphs 0012-0014 and figure 1).

Yoko also teaches that a covering layer of silicon containing polymer film such as silicon on glass (SOG) film is spin-coated on the upper resist pattern (7) without dissolving the underlying resist (see abstract and paragraph 0013).

Yoko also discloses that the covering layer composed of suitable solvent depending on the polymer material, wherein the solvent will not dissolve the underlying resist layer (see figure 3e).

Yoko fails to teach that the covering layer (SOG) is a water-soluble polymer.

However, Forester et al teach that a liquid dielectric such as SOG includes water as a suitable solvent to form a uniform solution or dispersion of the dielectric material (col.3, lines 59-64).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to combine Forester et al's teaching into Yoko's process for efficiently making the covering layer with uniform dispersion of the SOG material in the aqueous solution during the deposition of the covering layer as taught by Forester et al.

As to claim 6, it would have been obvious that the covering layer such as the SOG layer is heated or baked to remove residual solvent because the coating of the SOG is performed by spin coating and baking or heating the coated layer is an obvious process step in order to solidify the coating (see the paragraph 0013).

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As to claim 9, Yoko teaches that the coated SOG film is etched back using a dry etching until a portion of the first resist pattern is exposed (see paragraphs 0012-0015 of the translated version and figure 1(i)).

Yoko also teaches that etching the first and second resist pattern as the residual covering layer being used as a mask layer (paragraphs 0016-0019).

5. Claims 10-14,16,19 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoko (JP-7-135140) in view of Forester et al (5,952,243) as applied to claims 2-4, 6, 9 and 21-23 above, and further in view of May et al (5,950,106).

Yoko teaches above in the paragraph 4 but fails to teach that the surface of the coated SOG film is performed using wet etching instead of dry etching.

However, in a method of forming patterns containing silicon-containing polymers, May et al teach that etching of a SOG layer can be performed preferable by dry etching but alternatively, can be done by wet etching (col.4, lines 25-28 and col.5, lines 40-48).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to combine May et al's teaching into modified Yoko's process because both the dry and wet etching are functionally equivalent for etching resist layer as taught by May et al.

As to claims 10 and 19, May et al teach that the wet etching is performed to etch or pattern the SOG using a diluted solution of nitric acid (col.5, lines 46-48).

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As to claim 22, Yoko teaches that the covering the SOG film and etching processes are continuously performed in a suitable coating and etching apparatus (see the abstract).

As to claims 12-14, Yoko teaches that the covering layer is silicon containing such as silicon on glass (SOG) (see the abstract).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.



Shamim Ahmed
Examiner
Art Unit 1765

SA
January 25, 2004